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# KILLDEER PARASITIZES MOUNTAIN PLOVER NEST

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ABSTRACT.—We discovered a Killdeer (*Charadrius vociferus*) incubating a nest containing three Mountain Plover (*Charadrius montanus*) eggs and three Killdeer eggs. The nest had been incubated about two weeks when discovered and was depredated three days later. To our knowledge this is the first known occurrence of a nest having eggs from both species. *Received 15 February 2000, accepted 23 May 2000.*

In Colorado most Mountain Plovers (*Charandrius montanus*) breed in the eastern part of the state (Kuenning and Kingery 1998). Primary breeding habitat is described as short vegetation dominated by buffalo grass (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*) on flat topography (Graul 1975, Knopf and Miller 1994, Knopf and Rupert 1999). Mountain Plovers are attracted to burned areas for nesting, feeding, and raising young (Knopf 1996). Unlike most plovers, they seek areas of local aridity and are rarely found near water (Knopf 1996). Nest sites consist of bare ground (Knopf and Miller 1994) in grazed areas, overgrazed tallgrass prairie (Luan 1957), and fallow and plowed fields on fragmented prairie (Shackford 1991, Kuenning and Kingery 1998, Knopf and Rupert 1999). Mountain Plovers begin laying eggs in late April and incubate an average of 29 days (Graul 1975). They may renest if nests are destroyed. There may be two clutches per pair; the male incubates one and the second is cared for by the female.

The Killdeer (*Charadrius vociferus*) nests statewide in Colorado and can use patches of open habitat that are too small to be used by Mountain Plovers. Killdeer breed in a variety of habitats including wet areas, dry grasslands, and gravel roads, and are often associated with wildlife or livestock (Nelson 1998). Typically, nests are on a raised area of barren ground with sparse cover. Killdeer nest as early as April and adults share in parental duties of a single nest. Eggs hatch an average of 25 days after incubation begins (Johnsgard 1981).

On 10 March 1999, three pastures were burned on Comanche National Grassland (37° 20' N, 102° 30' W), Baca Co., Colorado, to provide habitat for migrating and nesting Mountain Plovers (Svingen and Giesen 1999). Most plover nests (33 of 45) located on the Comanche in 1999 were found in one pasture (13D; 210 ha). Approximately 145 ha of the pasture were burned of which 65 ha are a quarter section. This quarter section contained 15 of 33 plover nests found within the pasture. Only three to four pairs of Killdeer were observed in the same pasture; one near the northwest corner of the quarter section, one or two near a stock tank (southwest corner), and one near the parasitized nest (southeast corner). A Killdeer was observed feigning injury previouly in the southeast corner but we did not locate a nest. Dominant vegetation was buffalo grass and blue grama.

We use the term "parasitize" to mean conditional parasitism (Amat 1998), which may occur when a female loses her partial clutch and deposits the remainder of her eggs in the nest of another individual. A parasitized nest was discovered about 750 m east of the stock tank on 18 May at 16:15 (MST) after a Killdeer was flushed from the site. The parasitized nest contained three Mountain Plover eggs (olive colored) arranged in the typical triangular pattern and three Killdeer eggs (creme colored; Fig. 1). Two eggs of each species were floated to determine status of development and all appeared to have been incubated about two weeks [i.e., egg floated vertically bobbing just above the water surface (Alberico 1995)]. When the nest was checked again 21 May at 06:32 it had been depredated. Large and small eggshell fragments of both species were found within 10 m of the nest. No Killdeer was observed near the site after the nest had been destroyed.

A number of possible events may have occurred in the combined Mountain Plover-Kill-

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FIG. 1. Eggs in the parasitized nest. Mountain Plover eggs are those in the center, upper left, and upper center. Killdeer eggs are at far right, lower right, and lower left.

deer nest. We suspect that a Mountain Plover initiated the nest and was first to lay eggs; and the Killdeer later parasitized the nest and remained to incubate, possibly after loss of its own nest. We base this speculation on four observations.

First, Killdeer nests are typically lined with pebbles or small stones (5–10 mm diameter) and have nest material such as twigs, seeds, weeds, and small plant stems (Johnsgard 1981, Nelson 1998). Nest material of the combined nest included dried manure chips, lichen, rabbit pellets, rootlets, and grass. This material is characteristic of the Mountain Plover (Knopf 1996) and was identical to other plover nests we observed.

Second, the Killdeer almost always has a clutch of four eggs (Bent 1929, Harrison 1978, Johnsgard 1981, Nelson 1998). Mountain Plover clutches typically contain three eggs although six-egg clutches have been reported (Dinsmore and Knopf 1999). It is possible that having six eggs in the nest caused the Killdeer to suppress laying its fourth. This would support the claim that the Killdeer was the second occupant of the nest. Two other possibilities exist for the nest having three instead of four Killdeer eggs. The Killdeer's first egg could have been destroyed at its own nest forcing it to find another site to complete its clutch, namely the Mountain Plover nest; a predator (e.g., canid or snake) could have removed a Killdeer egg intact from the nest before we discovered it and, within the next three days, another predator could have destroyed the remaining eggs. We suspect this latter predator was a small mammal or corvid because shell fragments were nearby.

Also, the overlap of suitable habitat in this area for both species might result in competition for territories and nest sites. Mountain Plovers are rarely seen with Killdeer (Knopf 1997), but Killdeer use diverse habitats that include plover breeding habitats, such as heavily grazed pastures, newly plowed fields, agricultural lands, disturbed areas, fallow fields (Bailey and Niedrach 1965, Nelson 1998), and especially burned shortgrass prairie (Knopf 1996). On several occasions we observed Killdeer and Mountain Plovers close together in the same fallow fields and burned pastures. The habitat around the nest seemed

especially suitable for Mountain Plovers, as indicated by their high density (15 nests in 63 ha). Only three to four pairs of Killdeer were ever sighted in the pasture. Thus, it is more likely that a Mountain Plover initiated the combined nest because of the greater density of plover nests in the pasture (33 nests).

Finally, during incubation adult Mountain Plovers spent an average of 42.3% (in 1969) and 57.8% (in 1971) of time during the day attending the nest (Graul 1975). This is low compared to other species of Charadriidae that share incubation. Both sexes of Killdeer participate about equally in incubation of their nest (Bailey and Niedrach 1965, Johnsgard 1981). Thus, it seems more likely that a Killdeer would expropriate an unattended (although occupied) Mountain Plover nest than that a Mountain Plover would parasitize a Killdeer nest that was closely attended and defended.

Interspecific nest parasitism among shorebirds is exceedingly rare (Amat 1998; L. W. Oring, pers. comm.). We found no known cases of nest parasitism by Mountain Plovers or Killdeer in the literature. This is the first record in approximately 1130 Mountain Plover nests to contain Killdeer eggs and have a Killdeer incubating [154 Mountain Plover nests found in five years (Graul 1975; Weld Co., Colorado), approximately 400 in ten years (Knopf, pers. comm.; Weld Co., Colorado), approximately 500 in five years (Dinsmore, pers. comm.; Montana), 33 in two years (Sordahl, pers. comm.; Weld Co., Colorado), and 45 in one year (this study; Baca Co., Colorado)].

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